4 The role of problem interpretations in understanding the development of everyday problem solving

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Imagine the following conversation between an 11-year-old and a 14-year-old. The two are fighting over how best to solve a problem that the 14-year-old experienced while working on a project at school. The problem involved completing the project so that it would be competitive for the class prize. The project partner no longer wishes to work with the 14-year-old as the partner thought the student was too bossy. The 11-year-old indicates that buckling down and doing the things that are needed to finish the project and win the prize is the best course of action. The 14-year-old, however, states that the best way to solve the problem is to talk with the project partner and convince the partner that you will be less bossy.

Research on the development of everyday problem solving has focused on how children and adults individually solve such everyday problems, describing developmental differences as due to individuals' experience and intellectual abilities (e.g., Berg, 1989; Cornelius & Caspi, 1987; Klaczynski, Laipple & Jurden, 1992; Spivack & Shure, 1982). As research has indicated that individuals' strategies are sensitive to the specific features of particular everyday problems (e.g., Berg, 1989; Cornelius & Caspi, 1987; Scribner, 1986), the role of context as an important influence on the form and function of everyday problem-solving skills across development has been acknowledged. Our research suggests that developmental differences in everyday problem solving may be due, in part, to variability in the ways that individuals interact with their context, with this interaction reflected in individuals' interpretations of everyday problems. That is, in the specific example above, the two individuals do not share the same interpretation of this problem: the 11-year-old interprets the problem as completing the project, whereas the 14-year-old interprets the problem as an interpersonal conflict with the project partner. These two different interpretations of the problem, then, have consequences for many aspects of the problem-solving process, including the strategies that are perceived as effective for solving the problem.

The primary goal of this chapter is to examine how individuals' interpretations of everyday problems are critical to understanding individuals' interactions with their context throughout development. As our perspective on intelligence as interaction is

heavily influenced by a contextual perspective on intellectual development, we will begin with a brief discussion of contextual perspectives. We will then translate this contextual perspective into a set of principles that guide our work more specifically in everyday problem solving and present a tentative framework that we use in our research in this area. Next, we discuss the results from two studies that illustrate the utility of our framework. Finally, we summarize and describe the implications of our framework for research in everyday problem solving and more generally on intellectual development.

Contextual perspectives to intellectual development

Several theories of intellectual or cognitive development within the last two decades adopt, at least loosely, a contextual perspective on development (e.g., Baltes, Dittmann-Kohli, & Dixon, 1984; Ceci, 1990; Laboratory of Comparative Human Cognition, 1982; Rogoff, 1982; Sternberg, 1984; see Dixon, 1992 and Wertsch & Kanner, 1992 for reviews). Although an extensive discussion of the tenets and philosophical assumptions of a contextual perspective is beyond the scope of this paper (see Altman & Rogoff, 1987; Lerner & Kauffmann, 1985; Pepper, 1942; Rosnow & Georgoudi, 1986), we will outline features common to many contextual models of intellectual development. Central to most of these theories is the view that intelligence or cognition is dependent on both the person and the context. The focus of many contextual perspectives on intellectual development is to understand how the intellectual activities of the individual are influenced by the demands and opportunities afforded by the context (Berry, 1984; Laboratory of Comparative Human Cognition, 1982). Intelligence, specifically, is concerned with the mental activity involved in providing an optimal fit between the individual and the demands of particular contexts (e.g., Baltes et al., 1984; Berg & Sternberg, 1985). Development is described not as a passive adaptation of an individual to a stable context, but as an active shaping and altering of both the individual and the context: "Just as the context changes the individual, the individual changes the context" (Lerner, Hultsch, & Dixon, 1983, p. 103).

As contextual perspectives to intellectual development view intelligence as tied to specific contexts (see Laboratory of Comparative Human Cognition, 1982), it has become important to examine contexts across development in order to make meaningful comparisons of intelligence across development. The implication has been "that intelligence will be different across cultures (and across contexts within cultures) insofar as there are differences in the kinds of problems that different cultural milieus pose their initiates" (Laboratory of Comparative Human Cognition, 1982, p. 710). Although no extensive developmental analyses have been conducted of the specific contexts that children and adults inhabit and the demands and opportunities of those contexts, some empirical work is present for certain developmental periods (e.g., Barker and associates, 1978 for children and Baltes, Wahl, & Schmid-Furstoss, 1990 for older adults) and theorists have speculated for other periods. For instance,

Barker and his colleagues (1978) conducted detailed observations of the behavior settings that elementary school children inhabit on a daily basis and found that children most frequently occupy settings dealing with school and family.

Although no such detailed analyses exist of the contexts that adults occupy across the life span, work on developmental life tasks suggests that the contexts of adults differ in a variety of ways across the life span. For instance, the work of Cantor and colleagues (e.g., Cantor, Norem, Niedenthal, Langston, & Brower, 1987) suggests that college students' tasks center around succeeding academically, getting along with others, developing an identity, and being separate from family. Havighurst (1972) and Neugarten, Moore, and Lowe (1968) characterized the developmental tasks of adults as changing from starting a family and an occupation in young adulthood to adjusting to impairments of health and to retirement during late adulthood. Baltes et al. (1984) argue that development tasks during adulthood move from the academic sphere during late adolescence/early adulthood to the more pragmatic sphere during middle and later adulthood.

Research on laypeople's conceptions of intelligence has been used to illustrate that the perceived intellectual demands required by these changing contexts may differ. People's conceptions of intelligence have been posited as providing an insider's perspective on the mental activity it takes to adapt to life contexts (e.g., Berg, 1990; Berry, 1984; Neisser, 1979; Sternberg, 1984). For instance, research by Siegler and Richards (1982) and Yussen and Kane (1983) indicates that adults and children agree that the characteristics that constitute intelligence during child development shift from sensorimotor and language skills in infancy to academic and social skills in grade school and then to social, motivational, and cognitive factors in young adulthood. Berg and Sternberg (1992) find that perceived intellectual demands change across the adult life span from an emphasis on more academic types of intellectual demands during young adulthood (e.g., interest in and ability to deal with novelty) to more pragmatic demands during late adulthood (e.g., everyday competencies).

Contextualists, then, are interested in how individuals adapt to and shape these changing environmental contexts and intellectual demands across the life span. As contexts do not remain the same across development nor across individuals within a given developmental period, contextualists maintain that there is no single outcome or endpoint to intellectual development (e.g., Rogoff, 1982; see Kessen, 1984 for a discussion). That is, the intellectual demands present in one context may require different mental processes and products than another context. The adaptation that occurs, then, occurs with respect to a specific context and may be construed as "local adaptation." An implication of this perspective is that there are no set measures or criteria for assessing intelligence that are optimal across development or across contexts with different intellectual demands.

Although contextual theorists share the notion of the importance of the context as an instigator of developmental change, they differ in their unit of analysis (e.g., Rogoff, 1982). Those coming from the Soviet tradition have emphasized the inseparability of the individual and the context (e.g., Lave, 1989; Rogoff, 1982),

whereas others have found it important to understand the separate role of the individual and the context as they interact, at least for the purposes of empirical research (e.g., Baltes, 1987; Berg, 1990; Klaczynski & Reese, 1991; Sternberg, 1984). We have found that our particular position on the separability of the individual and the context has moved from an interactional perspective (examining the ways in which individual and contextual features interact) to a more transactional perspective, in which individual and contextual features are fused in the individuals' interpretation or perspective of the problem environment.

Contextual perspective on everyday problem solving

Such contextual perspectives on intellectual development have brought attention to the types of intellectual tasks and problems individuals face in their familiar, natural settings, in addition to those that they face in the laboratory testing setting (e.g., Poon, Rubin, & Wilson, 1989; Rogoff & Lave, 1984; Sternberg & Wagner, 1986). This interest in intelligence and cognition in context has fostered examinations of how children and adults solve everyday or practical sorts of problems (e.g., Berg, 1989; Cornelius & Caspi, 1987; Sinnott, 1989). Our work on everyday problem solving across the life span utilizes a contextual perspective and is guided by a set of principles derived from this perspective. We shall first outline these principles, noting how this perspective and our work derived from it departs from much of the other work on everyday problem solving. We will then present a tentative framework that guides our current research on everyday problem solving.

Principles guiding our perspective

Everyday problem-solving context and the demands present in those contexts differ across development. The first principle derived from a contextual perspective is that the everyday problem-solving context may change across the life span, so that individuals of different ages are presented with different demands and opportunities for problem solving. In an ongoing study of everyday problems, we have started to examine aspects of the everyday problem-solving context (e.g., Sansone & Berg, 1993; Sansone, Berg, Weir, Calderone, Harpster, & Morgan, 1991). For the purposes of the present paper, we will present some preliminary results from four different age groups: kindergarten and first graders (N = 73, mean age = 6.1 years), fifth and sixth graders (N = 96, mean age = 10.92 years), college students (N = 128, mean age = 21.55 years), and older adults (N = 118, mean age = 72.6 years). We asked individuals to describe a recent problem (hassle, conflict, challenge, etc.) they had experienced and to describe the problem in as much detail as possible. This very open-ended method was chosen so that individuals could select the types of problems that were most salient to them and thereby give us a sense of what had prominence in their own view of the context of everyday problem solving (e.g., Higgins, King, & Mavin,

1982; McGuire & Padawer-Singer, 1986). We were interested in whether the types of domains of problems would remain constant across development or whether different types of problems would appear for different age groups.

Consistent with a contextual perspective, we did find that the everyday problem-solving context differed across development, as perceived by everyday problem solvers. The everyday problem-solving context for 5–6-year-olds consisted predominantly of problems dealing with family (e.g., fights with siblings, conflicts with parents) and with work (e.g., chores around the house). For 11–12-year-olds, however, the context shifted to the school environment (e.g., working on projects, having to work hard for a grade) and to activities dealing with free time (e.g., fixing a flat bicycle tire, working on hobbies). For our college students, no one context assumed primacy, with numerous contexts mentioned dealing with free time, work, friends, family, and romantic relationships. For our older adults, the family context and problems dealing with health were most frequently mentioned. Although this study cannot address whether such frequencies reflect the actual incidences of these sorts of everyday problem-solving contexts across development, they certainly demonstrate that the problems that are most salient to everyday problem solvers differ across the life span.

Further research in this project suggests that what problem solvers perceive to be required to achieve adaptation to their everyday problems differs across these contexts. To assess such perceived demands, we asked participants to describe attributes of the individual that they felt would best have been able to solve the problem that they mentioned (i.e., abilities, personality, talents, etc.). Our coding scheme, developed empirically from the attributes that participants mentioned, included a broad array of characteristics encompassing achievement motivation, cognitive abilities, experience, personality, social skills, and the mentioning of specific individuals. We found that individuals perceived such attributes to be differentially effective in solving problems depending on the domain in which the problem occurred. For instance, problems dealing with friends and family were perceived as relying more on social skills, whereas problems at school and work were perceived as relying more on cognitive abilities and experience.

Our research suggests that problem solvers perceive that aspects of their everyday problem-solving context differ across development and what is required to achieve adaptation to the demands present in those contexts differ. This work has implications for everyday problem-solving research. Much of the past research presents children and adults with hypothetical problem-solving scenarios that are couched in a particular context (e.g., Berg, 1989; Cornelius & Caspi, 1987; Sinnott, 1989). Although researchers typically justify the selection of such contexts on the basis of ecological validity, given the research described above, the importance or salience of such domains might differ across developmental groups. For example, Cornelius and Caspi (1987) presented young, middle-aged, and older adults with everyday problems drawn from six distinct life domains: economic/consumer, managing the home,

interpersonal conflicts with family, interpersonal conflicts with friends, and conflicts with co-workers. Clearly, some of these domains were of differential salience to participants in our study. Whether the differential salience of such contexts impacts aspects of the problem-solving process has yet to be demonstrated.

Strategies that accomplish adaptation may differ across contexts. As the contexts and demands differ across development, the strategies and abilities individuals may use to adapt to those contexts may differ. Much of the research in the everyday problem-solving literature has been aimed at investigating the different sorts of strategies that children and adults perceive to be effective or actually use in dealing with everyday problems and charting developmental trends. Implicit behind much of this work is that a particular type of strategy (e.g., one involving problem-focused action) is overall more effective than other sorts of strategies (e.g., those involving reliance on others) in solving a broad array of everyday problems (see Denney, 1989; Folkman, Lazarus, Pimley, & Novacek, 1987).

However, research suggests that a particular type of strategy is not perceived to be overall more effective in solving everyday problems, but that strategies are differentially effective depending on the context in which the everyday problem is placed (e.g., Berg, 1989; Ceci & Bronfenbrenner, 1985; Cornelius & Caspi, 1987; Scribner, 1986). For instance, Cornelius and Caspi (1987) found that four different types of strategies (i.e., problem-focused action, cognitive problem analysis, passive–dependent behavior, and avoidant thinking and denial) were viewed as differentially effective by the domain of the problem (e.g., consumer, information, home, family, etc.) as well as by the specific problem presented within each domain. Mischel (1984) noted that such sensitivity to specific contexts may actually be preferable to the use of solutions that are consistent across situations and that, in many cases, consistency across situations may be maladaptive. Thus, everyday problem solving across the life span may not be best characterized as a process whereby individuals become more likely to use "optimal" strategies that are effective across contexts. Rather, the process of development may be better construed as individuals becoming more able to modify their strategies to the specific contextual features of everyday problems (see Berg, 1989; Rogoff, Gauvain, & Gardner, 1986).

Although strategies have been found to differ depending on the context, just what in the context produces such differences has not been clear (see Ceci, 1990). Part of the difficulty lies in the multiple uses of the word context. For instance, the term context has been used to refer to the place in which an activity occurs (e.g., Ceci & Bronfenbrenner, 1985; Wertsch, Minick, & Arns, 1984), the domain or content of the activity (e.g., Cornelius & Caspi, 1987), the functioning or meaning of the task (e.g., Scribner, 1986), the way in which a task is framed (e.g., Rogoff & Waddell, 1982), the presence or absence of others (e.g., Goodnow, 1986; Meacham & Emont, 1989), familiarity of stimulus items (e.g., Denney & Palmer, 1989), etc. However, even when context is further specified in these terms, the effects of context on cognitive strategies have not always been consistent for any one of these variables. Our use of

the word context draws on this literature, but has come to mean how context is represented in the psychological environment of the individual (see also Lewin, 1951). As will be discussed later, although the actual context might include the fact that a particular problem occurs at home, if this contextual feature is not salient to the individual, then this particular contextual factor might not impact the strategies the individual uses.

Strategies that accomplish adaptation may differ across individuals. Strategies are not only affected by the context and the demands and opportunities present in those contexts, but also by features that the individual brings to the problem-solving environment. Such individual features include the individual's developmental level, experience, and underlying intellectual abilities. Most of the everyday problem-solving literature focuses on these individual differences, positing that some combination of these individual features leads to more optimal problem-solving performance (e.g., Band & Weisz, 1988; Ceci & Liker, 1986; Denney, 1989; Willis & Schaie, 1986).

The most prominent individual factor investigated in the developmental literature on everyday problem solving has been the effect of age on the strategies individuals use to approach everyday problems. For instance, Band and Weisz (1988) found that older children were more likely to use secondary control strategies (i.e., efforts to modify the individuals' own subjective psychological state to fit better with the present conditions of the problem), whereas younger children were more likely to use primary control strategies (i.e., efforts to influence the problem by bringing the problem conditions more in line with the problem solver's wishes). Folkman et al. (1987) found that older adults were more likely to use passive and emotion-focused coping, whereas young adults were more likely to use active problem-focused coping strategies. Denney and Palmer (1981) also found adult age differences in strategies, with older adults relying more on others than younger adults, who were more likely to solve problems on their own initiative.

Other individual features that have impacted strategy use, but have received somewhat less attention, include an individual's underlying cognitive abilities and actual experience. Individuals who differ in underlying cognitive abilities have been found to differ in how they solve everyday problems, with more cognitively advanced individuals utilizing more advanced everyday problem-solving strategies (Brotman-Band, in press; Kuhn, Pennington, & Leadbetter, 1983). Experience has also been found to lead individuals to adopt more complex strategies for solving everyday problems (e.g., Ceci & Liker, 1986), to search through relevant problem information in a more goal-directed fashion (e.g., Charness, 1981; Walsh & Hershey, in press), and to lead to more effective solutions (e.g., Ceci & Liker, 1986; Walsh & Hershey, in press).

Numerous other individual features exist that might impact strategy utilization, such as gender, individual differences in personality, social skills, and achievement motivation. Although the individual could be described with all of these individual

features, all such features may not be important for understanding individual differences in strategy use within a particular task. That is, everyday problem-solving tasks may elicit different individual features that are involved in the problem-solving process. Thus, this interaction between contextual and individual features is important to understanding aspects of the problem-solving process.

Optimality of everyday problem-solving performance depends on the interaction of individual and context. As the everyday problem-solving context differs across development and the strategies needed to adapt to these contexts differ, what defines an optimal strategy for any given problem is a function of what the individual brings to it in terms of his or her abilities, experiences, and developmental level, and his or her representation of the context. An implication of this perspective is that there is no a priori criterion for optimal everyday problem-solving performance that exists across development or across contexts, much as there is no telos to which intellectual development is directed in the larger contextual perspective. Such a conclusion may seem like radical relativism in light of a number of studies that do impose a set criterion for everyday problem solving across contexts and development (e.g., Denney, 1989; Folkman, Lazarus, & Pimley, 1987; Willis & Schaie, 1991).

In our large life-span study of everyday problem solving, we have found that strategies that are often viewed by researchers as ineffective for solving problems are not necessarily viewed as ineffective by the problem solver's themselves (Berg, Calderone, & Gunderson, 1990). In this study, individuals' strategies for solving their everyday problems were coded as representing primary, secondary, or relinquishing (i.e., no apparent attempt to deal with the problem) control strategies, after distinctions advanced by Rothbaum, Weisz, and Snyder (1982) and Band and Weisz (1988), discussed above. In examining individuals' ratings of the effectiveness of their strategies, we found that overall primary and secondary control strategies were viewed as equally effective, with relinquishing control viewed as less effective. However, even within the relinquishing-control category, we found a wide range in the perceived effectiveness of such strategies, with some individuals rating the effectiveness of their solutions quite high. For instance, one young adult reported a recurring interpersonal problem that she was having at work where co-workers were rude to her and reported that she had done nothing to deal with the problem. When she was queried as to why she had done nothing to deal with the problem, she indicated that she had tried several active problem-focused strategies in the past that did not seem to be effective.

We interpret such results to mean that the effectiveness of a problem-solving strategy depends on the demands present in the context and what the individual brings to the problem-solving situation in terms of his or her history (e.g., experiences and abilities). Thus, a particular type of strategy (e.g., primary, secondary, or relinquishing control) cannot be deemed a priori to be more effective across all contexts or for all individuals (c.f. Band & Weisz, 1988), as is often done (e.g., Denney & Palmer, 1981; Folkman, Lazarus, & Pimley, 1987).

Framework for examining everyday problem solving

Our view that the everyday problem-solving process is dependent on how the individual, with his or her abilities and experiences, interacts with the demands and opportunities of his or her context, might at first glance seem nearly chaotic. That is, there seem to be no general strategies that individuals might employ optimally across situations and across development. However, we have found that such an organizing construct may be found in the individual's perspective, definition, or interpretation of the problem, which captures the transaction of the individual with his or her context. Our notion of problem interpretation (see also Sansone & Berg, 1993) is similar to Sinnott's "essence" of a problem (1989), Leont'ev's object of an activity (1981), Newell and Simon's (1972) idea of problem space, and Lewin's (1936, 1951) activated portion of the life space. Such interpretations might include the content of the problem (e.g., whether it be interpersonal or task-oriented), the category or type of problem (e.g., logical problem, pragmatic problem), and the extent of the problem space (e.g., confined within the constraints of the problem versus enlarged to include experiential components of the person's life).

As can be seen in Figure 4.1, an individual's problem interpretation involves the transaction of the individual with his or her context. This interpretation derives from features of the individual and of the context and yet may not include all of those individual and contextual features that are present in the problem situation. For instance, the individual could draw on his or her experience, age, gender, and

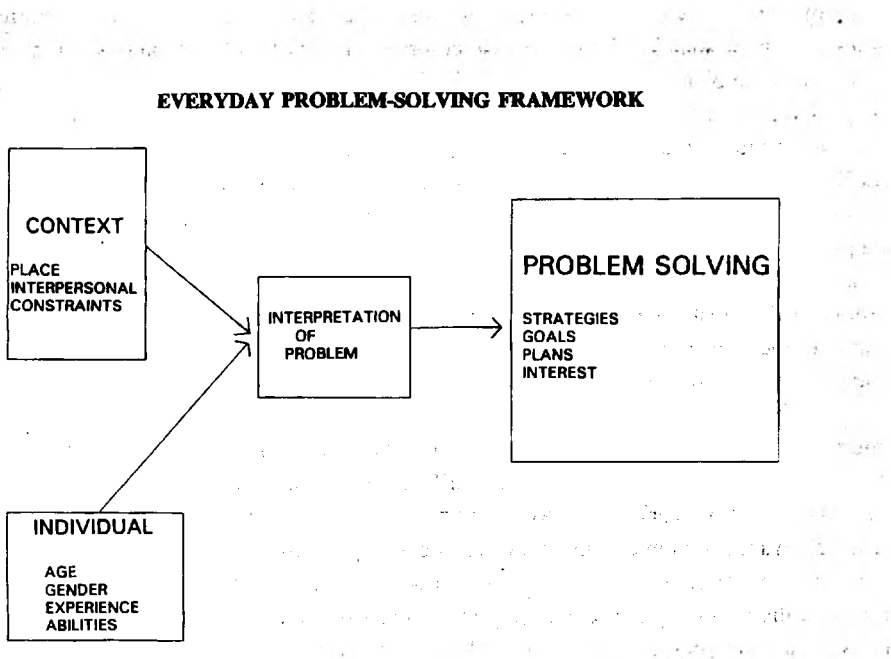

Figure 4.1. Everyday problem-solving framework.

underlying intellectual abilities to approach the problem and yet all of these features may not be reflected in the individual's interpretation of the problem. Similarly, the context of the problem might contain aspects of the physical environment, interpersonal constraints, and time pressure and yet such features may or may not be relevant to an individual's interpretation. In fact, such individual and contextual features may be differentially relevant at various points in development, contributing to developmental differences in problem interpretations.

We view the individual's problem interpretation as an important factor in influencing aspects of the problem-solving process, as opposed to what an outside perceiver might see as relevant to the context or the individual solving the problem. An individual's problem interpretation is posited to influence many aspects of the problem-solving process, including the strategies an individual perceives to be effective and actually uses in solving everyday problems. We view such problem interpretations as potentially important in understanding developmental differences in how individuals solve everyday problems, in that differences in performance may be due to individuals of various ages interpreting problems in a disparate fashion.

Several very recent examinations of problem solving lend support to the view that an individual's problem interpretation will influence aspects of the problem-solving process and that such differences in interpretation may be useful in understanding developmental differences in performance. For instance, Sinnott (1989) found that older adults interpret Piagetian logical combination problems, particularly those couched in an everyday context (e.g., allocating pairs of relatives to sleeping quarters), in a greater variety of ways than younger adults. Older adults placed more emphasis on the social and interpersonal components of the problem than the younger adults, who emphasized the formal and logical components of the problem. Sinnott suggested that many of the older adults performed poorly on these tasks because they interpreted the problems in a different fashion than young adults. Stronger evidence for the mediational role of problem interpretations in understanding developmental differences in problem-solving performance comes from work by Laipple (1991). Laipple found that older adults were less likely to interpret logical problems with the meaning intended by the experimenter (i.e., staying within the logical confines of the problem), but instead imputed elements of their own experience in the problem context. Such different interpretations were able to account for all of the age differences in problem-solving performance between the young and old adults.

Thus, these two recent studies point to the relation between individuals' problem interpretation and their subsequent performance and to the role of problem interpretation in explaining developmental differences in performance. As will be discussed below, this work has important implications for much of the current and past research examining developmental differences in problem-solving tasks both in and outside of the laboratory setting. We will now turn to a discussion of two studies that illustrate the importance of examining individuals' interpretations of everyday problems in understanding how individuals across development and across different contexts deal with such problems.

Developmental differences in everyday problem solving

The first study to be described was an initial attempt to examine the knowledge that children and adolescents have of the effectiveness of strategies for dealing with everyday problems. Very little work had been conducted prior to or after this study of children's everyday problem solving, although work in social problem solving (e.g., Spivack & Shure, 1982) and coping (e.g., Band & Weisz, 1988) was relevant. This study nicely illustrates how the perceived effectiveness of strategies differs by features of the context (and situation within context) and by features of the individual (e.g., age and gender). However, what the first author had perceived to be chaos in the contextual and individual specificity of strategy effectiveness we now see as potentially organized by the individual's interpretation of each problem. That is, we speculated that the contextual and individual specificity of strategy effectiveness might be mediated by the fact that individuals of different ages and genders were interpreting individual problems in different ways. The second study examined whether children and adolescents differed in their interpretations of everyday problems and whether such interpretations could relate to differences in strategy knowledge.

Study 1. Knowledge of strategies for dealing with everyday problems

The primary purpose of this study (Berg, 1989) was to examine the knowledge that children and adolescents have of the strategies that are effective for dealing with everyday problems. First we examined whether different types of strategies were perceived as differentially effective by children and adolescents for approaching everyday problems couched in two different settings (i.e., school context or outside of the school context). Of particular interest was whether the strategies that children and adolescents viewed as effective would be similar across contexts or would differ depending on the context. Problem analogs were constructed that were very similar in content across the two contexts, school and outside of school, and individuals rated the effectiveness of six different types of strategies. Second, we examined whether there were developmental differences in children's and adolescent's strategy knowledge. Optimal strategy knowledge was viewed as resemblance to a prototype of a good everyday problem solver. The optimality of strategy knowledge was operationalized by comparing students' responses to teachers' responses and to a group of students who had been nominated by their teachers and themselves to be "good" everyday problem solvers. Third, the relation between students' ability to use strategy knowledge and measures of school achievement (e.g., grades and achievement scores) was explored, in order to understand whether everyday problem solving was distinct from more traditional measures of academic achievement.

Method. Participants included 217 fifth-grade (N = 87, M age = 11 years, 5 months; SD = 5.6 months), eighth-grade (N = 64, M age = 14 years, 1 month; SD = 4.2 months), and eleventh-grade (N = 66, M age = 17 years, 4 months; SD = 6.7 months) students

drawn from public schools in the Greater New Haven area in southeastern Connecticut.

Students' everyday problem solving was assessed through a questionnaire consisting of 20 everyday problems. One-half of the students solved problems that were couched in the school setting (e.g., dealing with teachers, meeting school deadlines, and receiving unanticipated grades); the other half solved problems that occurred outside of the school setting (e.g., dealing with parents and siblings, hobbies, and chores around the house). The problems for these questionnaires came, in part, from surveys of the daily hassles and life events that face individuals of these ages (e.g., Clabby & Elias, 1986; Coddington, 1972a,b; Compas, 1987; Metcalf, Dobson, Cook, & Michaud, 1982). Five situations on the School and Outside of School Questionnaires were written to have similar content. Although the same problems were used for all participants, small adjustments were made in some aspects of the problems across the three grade levels to make them relevant for a particular grade level (e.g., in the sample problem below, we adjusted the curfew times).

Each questionnaire presented problems that contained a conflict that could be reduced by taking one of six courses of action. Individuals read a given problem and then rated six strategies on a 1 (very bad) to 7 (very good) scale as to how good they thought the option would be in solving the problem. These six strategies consisted of the following categories of dealing with problems: *plan* to take action sometime in the future; *seek* more information about the problem; *change perception* of the problem by redefining elements of the problem so that it was seen in a new light; *adapt* to the problem through self-initiated action that would make the problem solver's behavior conform better to the demands of the problem; *shape* the environment to change elements of the problem situation so that it would fit better with the problem solver's needs and goals; and *select* another environment by removing oneself from the problem environment in order to avoid the conflict inherent in the problem. These six strategies were drawn from the work of contextual theorists of intellectual development (e.g., Sternberg, 1985), research examining everyday intellectual skills in the work place (e.g., Fredericksen, 1986), and research on coping and stress (e.g., Lazarus & Folkman, 1984). A sample problem on the outside of school questionnaire is listed below.[1]

Sample questionnaire

Your parents have become more strict about what time you must be home at night. On Friday and Saturday nights you have to be home by 10:30. You and your friends want to go out to a movie on Friday night that will not be over until 11:00, so you wouldn't be home until 11:30. You find out from the movie theater that the movie will be showing at the theater for one more week. Rate how good each of the answers is in *allowing you to see the movie and be home by 10:30.*

a. Ask your friends if they have a strict time that they must be home at night (seek).
b. Decide that seeing the movie is really not worth causing problems with your parents (change perception).

c. Wait to see the movie on Saturday afternoon (adapt).
d. Persuade your parents that the new rule is not fair (shape).
e. Spend Friday night at the house of a friend who does not have to be home so early (select).
f. Plan how you could both see the movie and be home by 10:30 (plan).

Students then turned the page over and on the back of the sheet were again presented with the same problem but with additional information that either added a new constraint or obstacle in the problem or removed one. The results of this manipulation will not be discussed here as the manipulation did not interact with age or strategy in any theoretically meaningful way (see Berg, 1989, for full results).

Eighteen teachers also completed the Everyday Problems Questionnaire: 5 fifth-grade teachers, 10 eighth-grade teachers, and 3 eleventh-grade teachers. They were asked to rate the strategies as to how effective they would be in solving the problem for a student. Internal consistency reliability (coefficient alpha) for teachers was .86 on these ratings, indicating a high degree of consistency within the group of teachers in their profile of ratings.

Results. The first question to be addressed was whether certain strategies were perceived as differentially effective across the two contexts (school and outside school) and by individuals of different ages. Analyses of variance directed toward this question were restricted to the set of five problems that were written to be analogues on the School and Outside School Problems Questionnaires (see Table 4.1 for the means). Certain strategies were perceived to be more effective than others (F (5, 965) = 261.09, $p < .01$), with the strategy of adapting to the problem seen as the most effective option, planning viewed as next most effective, seeking more information, changing one's perception, and shaping viewed as next most effective, and selecting out of the environment seen as the least effective strategy. However, this main effect was qualified by an interaction between strategy and type of questionnaire (F (5, 965) = 27.02, $p < .01$), indicating that certain strategies were perceived as more effective in the school setting than outside of the school setting. For instance, the strategies of planning, seeking more information, and adapting to the environment were seen as more effective outside of the school setting than in it. In addition, a significant interaction among strategy, type of questionnaire, and grade level (F (10, 965) = 3.0, $p < .05$) indicated that the differences in perceived effectiveness of strategies on the School and Outside School Questionnaires were more marked for the eighth and eleventh graders than for the fifth graders.

These effects of strategy differences were further examined by including the actual problem situation as a factor in the design. The results of this analysis illustrate how strategy effectiveness differed as a function of the context of the specific problem. The problem type by strategy interaction was highly significant, F (20, 3860) = 65.9, $p < .01$), indicating that certain strategies were perceived as more or less effective for certain problems than for others. In addition, a significant problem type by strategy by grade level interaction (F (40, 3860) = 3.62, $p < .01$), indicated that the strategy by problem situation interaction differed by grade level. A similar interaction was

Table 4.1. Means of the six strategies for the everyday-problems questionnaires: analogous problems

	Strategy					
Subjects	Plan	Seek	Change	Adapt	Shape	Select
School questionnaire						
5th graders						
Male	4.8	4.5	4.2	4.8	4.3	3.4
Female	5.1	4.8	4.7	5.0	4.9	3.4
8th graders						
Male	4.5	4.4	4.8	4.7	4.1	3.3
Female	4.8	4.3	4.8	5.1	4.6	3.1
11th graders						
Male	4.2	4.1	4.4	4.4	3.5	2.9
Female	4.7	4.5	5.1	4.9	4.4	3.0
Overall school	4.7	4.4	4.7	4.8	4.3	3.2
Outside-school questionnaire						
5th graders						
Male	5.3	4.9	4.3	5.5	4.5	3.3
Female	4.9	4.4	4.2	5.4	4.1	2.8
8th graders						
Male	5.1	4.8	4.1	5.9	4.7	3.2
Female	5.4	5.2	4.2	6.0	4.7	3.1
11th graders						
Male	5.1	4.7	4.3	5.8	4.5	3.0
Female	5.0	4.6	4.2	5.8	4.3	2.6
Overall outside school	5.1	4.7	4.2	5.7	4.4	3.0
Overall	4.9	4.6	4.4	5.2	4.4	3.1

found among problem situation, strategy, and gender, F (20, 3860) = 4.51, $p < .01$), indicating that differences in strategy effectiveness across problems differed by gender.

In sum, the perceived effectiveness of these six strategies was highly dependent on the overall context in which the problem occurred (i.e., school or outside of school) and the specific demands presented by each individual problem. In addition, gender and age modified these context effects in subtle, and not always interpretable ways.

Our second question was to address whether developmental differences would occur in an overall measure of children's and adolescents' strategy knowledge. Strategy knowledge was quantified by correlating the students' profile of responses across all twenty items with the profile of ratings that teachers gave these responses. Good strategy knowledge scores were indicated by high correlations between the students' ratings and the ratings of the teacher group; poor strategy knowledge scores were indicated by low and sometimes negative correlations between the students' ratings and the ratings of the teacher group. Another approach to defining an expert

group of individuals was used, namely using students who had been rated by their teachers and themselves as much better than other students in their ability to solve everyday problems. Using this group to compute strategy knowledge scores yielded results that were similar to those reported here.

Grade level of the student did relate to strategy knowledge scores (F (2, 193) = 10.72), with eleventh graders scoring significantly higher (.54) than eighth graders (.47), who scored higher than fifth graders (.42). In addition, a significant effect of gender (F (1, 193) = 10.53, $p < .05$), indicated that females scored higher (.50) than did males (.43). The domain of the questionnaire did not impact strategy knowledge scores. Thus, the results indicated that older students' and females' profiles of strategy knowledge were more consistent with the teacher profile of strategy knowledge than were younger students and males.

Finally, we examined the relation between strategy knowledge scores and more traditional measures of academic achievement (composite achievement test scores and grade-point average (GPA)). As can be seen in Table 4.2, correlations between mean strategy knowledge scores and academic achievement were highest for the fifth graders and were more moderate for the eighth- and eleventh-grade students. These

Table 4.2. Relations among strategy-knowledge score, achievement score, and grade point average (GPA)

Subjects	*N*	*M*, strategy-knowledge score
School forms		
5th graders		
Achievement test	41	.57**
Semester GPA	40	.38**
8th graders		
Achievement test	33	.15
Semester GPA	33	.24
11th graders		
Achievement test	30	.18
Semester GPA	31	.32
Outside-school forms		
5th graders		
Achievement test	45	.44**
Semester GPA	45	.24
8th graders		
Achievement test	31	.29
Semester GPA	31	.41*
11th graders		
Achievement test	30	.26
Semester GPA	34	.37*

*p < .05
**p < .01.

relations indicate that although strategy knowledge scores are related to the domain of intelligence, they do measure something different than what is tapped by achievement scores and other measures of academic success.

Two important conclusions can be drawn from these results. First, the effectiveness of strategies depends on the domain in which the problem is embedded, the specific conditions of the actual problem context, and the grade and gender of the students rating such strategies. These findings confirm one of our guiding principles that the strategies that are perceived as accomplishing adaptation may differ across context and across development. Given a contextual perspective, it would not seem likely that the strategy that will provide a better fit with the demands of one's environment will be the same across problems that may present different demands. We had not anticipated, however, that the perceived effectiveness of strategies would vary with the conditions present in each problem and thus contextual specificity seemed overwhelming. This contextual specificity was more apparent in the responses of the eighth and eleventh graders than in those of the fifth graders, indicating that older students may have been more sensitive to the context in which the problems were presented.

Second, strategy knowledge, as quantified in terms of how closely students matched a prototype of "good" everyday problem solving, increased with age and differed by gender, favoring females. This study was not able to capture why these groups outperformed other students. That is, developmental and gender differences were not attributable to the level of familiarity or experience students had with these problems.

A closer examination of the everyday problems used in this study revealed a possible mechanism that might help to explain the variability in strategy effectiveness across problems and developmental and gender differences in strategy knowledge. Many of the problems used in the study could be interpreted in a variety of different ways and such interpretations often had consequences for the sorts of strategies viewed as effective in solving the problem. For instance, one of the problems used involved competing against a friend for the office of class president. Such a problem could be interpreted in at least two ways. One interpretation focuses on the interpersonal theme of maintaining the friendship in spite of the competition. A second interpretation is more task-oriented and involves winning the election. These different interpretations of the problem inherent in the situation could influence the types of strategies perceived as effective in solving the problem. For instance, if one's interpretation is to "win the election," then an effective strategy might be to talk to friends to persuade them to vote for you. Such a strategy might not be perceived as most effective if one's interpretation is to maintain the friendship. These two different classes of interpretations, task-oriented and interpersonal, seemed to run across a number of the problems used in the Berg (1989) study. Thus, a second study was designed to examine whether problem interpretations could impact strategy knowledge and whether developmental and gender differences in interpretations might contribute to overall differences in everyday problem-solving performance.

Study 2: The role of problem interpretation on strategy knowledge

A second study was conducted in order to examine whether problem interpretations might be useful for understanding developmental and gender differences in rated strategy effectiveness. First, we examined whether individuals of different ages and genders would interpret problems differently. We presented children and adolescents with everyday problem scenarios that contained interpersonal and task components. Individuals then interpreted what the "real" problem was in the scenario and such interpretations were coded as to whether they contained an interpersonal or a task focus. Second, we examined whether individual differences in problem interpretation were related to strategy-effectiveness ratings. Strategy options were written so that they dealt either with the interpersonal component or the task component of the problem scenario. We predicted that individuals who interpreted the problem as being task oriented would rate the strategies that dealt with the task element of the problem higher than strategies that dealt with the interpersonal component. Similarly, individuals who interpreted the problem as being interpersonally oriented would rate the strategies that dealt with the interpersonal elements of the problem higher than strategies that dealt with the task component.

Method. Participants were 163 students from public schools in the Greater Salt Lake City area in Utah and included fifty-nine fifth graders (M age = 10.8, SD = .49), forty-six eighth graders (M age = 13.6, SD = .49), and fifty-eight eleventh graders (M age = 16.7, SD = .06).

Students' interpretations of problems and strategy knowledge were assessed through a questionnaire consisting of eight analog pairs of problems making a total of 16 everyday problems. The problems were derived from Berg (1989) and from children's actual reports of their own everyday problems in the larger life-span study of everyday problem solving discussed above (Berg, Calderone, & Gunderson, 1991; Sansone & Berg, 1993). The eight analog pairs presented to students were designed so that one problem in each pair was embedded in a school context and the other problem in the pair was embedded in a family context. The analog problem pairs were nearly identical. For instance, students were asked to think about a problem dealing with a friend's broken calculator at school, and to think about a problem dealing with a sibling's broken mountain bike at home.

Problems were constructed so that they could involve at least two different interpretations: a task-oriented interpretation, in which a specific task not involving others is approached; and an interpersonally oriented interpretation, in which some sort of enduring problem with another individual is described. These two interpretations were chosen as such definitions spontaneously emerge when children and adolescents describe their own everyday problems (see Sansone, Berg, & Weir, 1991) and may have impacted strategy knowledge ratings in Berg (1989). In the above example, a task-oriented interpretation of the problem would focus on dealing with the calculator or bike, and an interpersonally oriented interpretation would focus on dealing with the

upset friend or sibling. Students' interpretations of the 16 problems were collected by asking them to, "Please write down what you think is the real problem."

Interpretations of the problems were categorized into groups by two trained coders. Coders made judgments on 25% of the protocols and achieved an overall reliability of 85%. Discrepancies were resolved through discussion. After achieving reliability, one of the coders completed the rest of the protocols. Four categories of interpretations were found. They included the anticipated task-oriented (focus was on accomplishing a specific task) and interpersonally oriented interpretations (focus was on another person), as well as self-oriented interpretations (focus was on some aspect of the self), interpretations that were combinations of the three, and other interpretations (typically these did not include interpretations, but rather strategies for how to solve the problem).

After students defined the problem, they were presented with four alternative strategies for dealing with the problem and rated these strategies on a 1 (very bad) to 7 (very good) scale. Two of the four strategies were designed to be a good fit with a task-oriented interpretation, and the other two strategies were designed to be a good fit with an interpersonally oriented interpretation. The two strategies provided for each of the two interpretations were of different types. One was a primary strategy and the other was a secondary strategy, after distinctions made by Rothbaum, Weisz, & Snyder (1982) and Band and Weisz (1988), discussed above. An example of a specific problem and strategies provided for the problem dealing with a broken calculator at school are listed below.

Sample questionnaire. You have borrowed your friend's brand new calculator to try it out. You were being rough with it, and you accidentally dropped it on the hall floor. The display window is cracked. Your friend really looked forward to getting this calculator and will probably be very upset that you damaged it.

a. Pay for the calculator repairs (strategy is primary and task oriented).
b. Decide that, since it was an accident, the calculator is no big deal (strategy is secondary and task oriented).
c. Talk to your friend so that your friend won't be too upset (strategy is primary and interpersonally oriented).
d. Realize that the two of you will not fight about it (strategy is secondary and interpersonally oriented).

Results. The primary question to be addressed in this study was whether age and gender-related differences in problem interpretations might relate to differences in strategy knowledge. We first examined age- and gender-related differences in the four types of problem interpretations. Separate chi-square analyses for grade level and gender were both significant ($\chi^2 = 239.79$, df = 8, $p < .01$ for grade level; $\chi^2 = 111.08$, df = 4, $p < .01$ for gender). These analyses were followed up with one sample chi-square analyses. As can be seen in Table 4.3, younger children were more likely to interpret the problems in a task-oriented fashion than older children. Also, older adolescents had higher percentages of interpretations that were self oriented and that

Table 4.3. Relationships between developmental level and problem interpretation

	Developmental level		
Problem interpretation	5th grade	8th grade	11th grade
Task-oriented	32%	24%	17%
Interpersonal-oriented	42%	45%	47%
Self-oriented	9%	12%	13%
Mixed	8%	9%	13%
Other	9%	9%	10%

were mixtures of the self, task, and interpersonal orientations than younger children. With regard to the gender difference (see Table 4.4) males were slightly, but not significantly, more likely to interpret problems in a task-oriented fashion than females, who were more likely to interpret problems in an interpersonally oriented fashion, self-oriented fashion, and using mixtures of the categories than males. In addition, problem interpretations differed by domain ($\chi^2 = 20.9, p < .01$) such that self and mixed interpretations were more likely in the school domain.

Given that there were gender- and age-related differences in the ways in which problems were interpreted, we were interested in the relation between such interpretations and students' ratings of strategy effectiveness. Two repeated measures ANOVAs, one for problems in the family domain and the other for problems in the school domain,[2] were conducted with grade level, gender, interpretation of the problem, strategy orientation (interpersonal or task), and strategy type (primary or secondary) as the independent variables and strategy effectiveness ratings as the dependent variable. We will only mention the effects that are relevant to the primary questions addressed in this paper (see Calderone, 1993 for full results).

For the analysis of the family problems, the anticipated interaction between interpretation of the problem and strategy orientation was significant ($F(4, 421) = 7.01$, $p < .01$). This effect was modified by a significant strategy type by strategy orientation

Table 4.4. Relationships between gender and problem interpretations

	Gender	
Problem interpretation	Female	Male
Task-oriented	23%	26%
Interpersonal-oriented	46%	42%
Self-oriented	12%	11%
Mixed	12%	8%
Other	8%	12%

by interpretation of the problem interaction (F (4, 421) = 11.7, $p < .01$). This interaction revealed that our predicted relation between task- and interpersonally oriented interpretations and strategy orientations was restricted to the primary strategies and did not hold for secondary strategies. As was predicted (see Table 4.5) and confirmed through planned comparisons, individuals who interpreted problems in an interpersonal manner rated the effectiveness of strategies dealing with interpersonal components of the problems higher than they did strategies dealing with task components. Likewise, individuals who interpreted problems in a task manner rated the effectiveness of strategies dealing with task components higher than they did strategies dealing with interpersonal components. An additional five-way interaction between strategy type, strategy orientation, problem interpretation, grade level, and gender (F (8, 421) = 2.65, $p < .05$) revealed that the predicted interaction was more prominent for certain ages and genders than others. More specifically, the relation between problem interpretation and strategy orientation for primary strategies was not as pronounced for fifth-grade males and eighth-grade females.

The same predicted interaction between problem interpretation and strategy orientation holds for performance on the school problems (F (4, 461) = 5.66, $p < .01$). Again, this interaction was modified by a significant problem interpretation by strategy orientation by strategy type interaction (F (4, 461) = 12.3, $p < .01$). That is, for primary strategies only, individuals who interpreted problems in interpersonal or task terms rated higher those strategies that were congruent with their task definitions (i.e., interpersonal interpretations resulted in higher effectiveness ratings for interpersonally oriented strategies than task-oriented strategies).

Table 4.5. Means of the four strategies by problem interpretation

	Type of strategy			
	Primary		Secondary	
	Interpretation	Task	Interpersonal	Task
School				
Task	4.87	5.78	3.34	2.17
Interpersonal	5.48	4.97	3.37	2.36
Self	5.16	5.87	3.19	2.08
Garbage	5.08	5.14	3.56	2.49
Mixed	5.32	5.65	3.44	2.32
Family				
Task	4.92	5.44	3.06	2.37
Interpersonal	5.42	4.98	3.22	2.21
Self	5.03	5.64	2.99	2.12
Garbage	5.02	5.46	3.21	2.52
Mixed	5.31	5.69	3.06	2.08

Discussion

Consistent with our framework, this study revealed that problem solvers interpret the same everyday problem in a variety of ways, that individuals of different ages and genders may focus on different interpretations, and that different domains may pull for different interpretations. With age, there was a decrease in the frequency of task interpretations and an increase in interpersonal, self, and mixed interpretations. The large decrease with age in the frequency of task interpretations may be related to developmental changes in the self system, moving from a system that is concrete and specific to one that incorporates psychological constructs and is more abstract and integrated, incorporating emotions and cognitions (see Harter, 1983 for a review). The increase in frequency of mixed orientations with age may suggest that older adolescents interpret problems in a more complex fashion than younger children, integrating multiple aspects of the problem. The finding that females focused more on interpersonal issues than males is consistent with a growing body of literature on the greater sensitivity to interpersonal issues among females (e.g., Gilligan, 1982; Tannen, 1990). In addition, problem interpretations differed by domain with school drawing for more self and mixed interpretations than the family domain. Consistent with our framework for everyday problem solving, then, individuals' interpretations of everyday problems were influenced both by aspects of the context and features of the individual.

In addition, these different interpretations had implications for how individuals thought about potential strategies for dealing with the problem. Specifically, individuals who interpreted the problem with either an interpersonal or task orientation perceived that strategies that were consistent with their interpretations were more effective than strategies that were inconsistent with their interpretations. The finding that the fit between problem interpretations and strategy ratings was localized to only one type of strategy, those that dealt with primary control but not with secondary control, is in need of further investigation. Secondary control strategies were perceived to be far less effective in dealing with the problem than were primary strategies. However, such a result has not always been found (see Band & Weisz, 1988; Berg, Calderone, & Gunderson, 1990). It is possible that the secondary control strategies included in this study were simply less effective than other secondary control strategies that could have been used and that other such strategies might show a relation between interpretations and strategy effectiveness.

One of the motivations for this study was to examine whether problem interpretations would be useful in explaining domain differences in strategy effectiveness and age and gender interactions with domain as were found in Berg (1989). Although the analyses reported here do not allow us to compare domains directly, there was no indication that domain impacted the relation between problem interpretation and strategy orientation. Subsequent hierarchical loglinear analyses, in which we were able to test for differences in domain, also confirmed that domain did not alter the relation between problem interpretation and strategy orientation and that older stu-

dents were no more likely to fit their strategies to their interpretations than younger individuals. Thus, it appears that the individual and contextual specificity of strategy effectiveness ratings found in Berg (1989) may have been due to domain and developmental and gender differences in problem interpretations.

This study and its approach at investigating problem interpretations is not without its limitations, which we are currently addressing in ongoing research. First, the assessment of problem interpretations relied heavily on verbal report and, as such, findings that older students were more likely to interpret problems in a more complex fashion (i.e., greater incidence of mixed interpretations) could be due to older students' greater verbal facility. Second, having students explicitly define problems may have made the strategies they rated that fit with those interpretations more salient. Clearly other methodologies need to be employed to investigate problem interpretations. We are currently examining problem interpretations through an in-depth interview so that individuals can be probed as to the extensiveness of their interpretations. In addition, problem interpretations can be investigated in a more implicit manner through differential memory for problem information, endorsement of statements regarding the problem situation, and priming techniques about problem components.

Summary and conclusions

In this paper, we have argued that individuals' interpretations of everyday problems are critical to understanding the development of everyday problem solving. A framework for examining everyday problem solving was presented, based on a contextual perspective to intellectual development. This framework presented a potential mechanism for understanding developmental differences in everyday problem-solving strategies, namely, an individual's interpretation of everyday problems. We view such interpretations as representative of the transaction of the individual with his or her context.

Two studies were presented that examined the influence of individual and contextual features on problem solvers' perceived effectiveness of strategies for dealing with everyday problems. In the first study, great individual and contextual specificity was found in individuals' strategy knowledge. In the second study, the role of individuals' interpretations in addressing such individual and contextual specificity was examined. This study revealed that individuals of different ages and genders interpret problems differently, interpretations that have consequences for the perceived effectiveness of strategies for dealing with everyday problems.

These results hold important implications for much of the work on everyday problem solving. First, the finding that individuals interpret problems differently and such interpretations have consequences for strategy knowledge is critical, as most of the work on everyday problem solving assumes that problem solvers hold a similar interpretation of the problem, most notably, the interpretation that the experimenter has in mind. For instance, in Berg (1989) strategy options were written primarily with the idea that individuals would interpret problems as dealing with specific tasks.

Although the problems in Berg were not written to have such an explicit tension between interpersonal and task components, many of the problems in Berg could have been interpreted with an interpersonal or self focus, as is true for problems used by Denney (see 1989 for a review) and Cornelius and Caspi (1987).

Our results caution investigators against assuming that problem scenarios can be written so that they draw exclusively for one particular orientation of interpretation or that even one kind of interpretation will best capture the everyday problem-solving process. That is, although the everyday problem scenarios in our second study were written to be interpreted with primarily a task or interpersonal focus, other interpretations emerged as well. Further, other types of interpretations that do not focus on the content or orientation of the interpretation may also be important in understanding the development of everyday problem solving. Other dimensions of interpretations could include concreteness versus abstraction, specificity, and the extent to which interpretations are constrained within the problem environment or rely on experience outside of the problem environment. For instance, in our current work (Berg & Klaczynski, in prep.) we have found that older adults' greater experience-based interpretations may relate to their inability to generate alternative problem solutions, as they state that in their experience only their given strategy will work.

The relation between interpretations and strategy effectiveness further cautions investigators not to view one particular type of strategy as overall more effective than others. Strategies may differ in both perceived and actual effectiveness, given an individual's interpretation of an everyday problem. Such results may call for a reinterpretation of developmental work on everyday problem solving. For example, Denney and Palmer (1981) found age differences, favoring young adults, in everyday problem-solving strategies. Older adults used strategies that involved reliance on others more so than young adults, which were coded as less effective than strategies that involved solving the problem by relying on one's own initiative. However, if older individuals in Denney and Palmer's study interpreted problems as interpersonally oriented, then strategies that relied on others may have been best fitted to solving the problem rather than strategies that relied on one's own initiative. Thus, such developmental differences could not necessarily be interpreted as representing deficiencies in one group versus another.

Future research is needed in order to understand the role of problem interpretations in the everyday problem-solving process. First, we need to understand the contextual and individual features that lead individuals to different interpretations. Variables such as an individual's perception of control (Klaczynski & Berg, 1992), perceived and actual experience (Elbaum, Berg, & Dodd, 1993), and an individual's underlying cognitive abilities may relate to their interpretations in predictable ways. Second, we need to understand the transactional process whereby individual and contextual features combine to create different interpretations of everyday problems. Third, the process by which different problem interpretations result in differential strategy effectiveness is an important area for future research. That is, in Newell and

Simon's (1972) terminology: Do different interpretations set up different problem spaces in which the problem solver operates? Do such interpretations restrict or constrain the type of information available in memory for the problem solver to use? Detailed analyses of individual's problem-solving processes are needed to address such questions. Fourth, research is needed to examine whether such relations between problem interpretations and strategies would hold when individuals solve their actual everyday problems.

Individuals' problem interpretations may not only be useful in understanding the development of everyday problem solving, but developmental differences in other types of cognitive and intellectual performance as well. The possible role of developmental differences in problem interpretations in explaining developmental differences in cognitive performance have been suggested for differences in childhood development in Piagetian tasks (e.g., Perret-Clermont, Perret, & Bell, in press), adult age differences in text processing (e.g., Adams, Labouvie-Vief, Hobart, & Dorosz, 1990; Gould, Trevithick, & Dixon, 1991), and decision making (e.g., Johnson, 1990). Such work points out that not all subjects interpret the intellectual and cognitive tasks that we present to them in the way that we as experimenters interpret such tasks (see also Lave, 1989).

The relation between problem interpretation and strategy effectiveness suggests a reorientation of research away from ordering individuals across development as to who is most effective against some apriori criterion, but rather understanding how it is that individuals across development adapt to the constraints of their environments. Such a reorientation focuses attention on the process of how individuals adapt to their everyday environments, rather than exclusively on the product. By focusing on the process, we will be better able to understand how individuals with their own individual histories (e.g., abilities and experience) interact with the demands and opportunities of their context.

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Notes

1 Note that information regarding the type of problem-solving strategy indicated in parentheses was not presented to subjects.

2 Two repeated measures ANOVAs were conducted rather than one ANOVA containing domain as a factor, for multiple reasons. First, the preferred method for conducting such an analysis through both SAS and SPSS requires that the setup of the analysis be appropriate for MANOVA. However, because the interpretation of a problem was a between-subjects variable that did not necessarily contain all levels for all subjects, MANOVA was not an appropriate procedure. Second, the univariate means of analyzing

the data was attempted, although virtual-memory limitations of the supercomputer were not sufficient to complete this analysis.

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